IDRC FEATURE

CANADA

*A monthly features service about science, technology, and development*



APPROX. 1000 words

IDRC-F173e

# INDIA HAS ENERGY BY THE CARTLOAD

by Rajiv Gupta

NEW DELHI, IDRC -- While researchers in many countries favour the extensive development of sophisticated new energy-harnessing techniques, some experts in India feel it is essential for the country to improve two traditional energy sources -- animal power and firewood.

Dr. N.S. Ramaswamy, director of the Indian Institute of Management at Bangalore (IIMB), which has been working on a project to modernize the bullock-cart system, estimates work animals in India provide as much energy as the country's entire electrical system.

Despite this colossal contribution, animal power remains neglected. Why? Dr. Ramaswamy feels that scientists and policymakers view animal energy as a passing phase in India's social and economic development. They believe modernization of agriculture and transport will eliminate work animals.

But they are mistaken, argues Dr. Ramaswamy. More than half the country's farm holdings are less than two hectares. These farms can never use tractors, he says. Similarly, only half of India's villages have paved roads on which trucks can ply. The bulk of the rural produce is carried to market towns on bullock-carts.

Moreover, animal power is the only alternative energy source already within the economic reach of the poor majority. Solar and wind energy systems and biogas plants, for instance, will take decades to meet the needs of the rural poor. "Whatever efforts are now going on regarding animal energy are only a fraction of

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what is needed, considering the vast existing investment and the vast potential of economic benefits to the country," says Dr. Ramaswamy.

IIMB has collected considerable data on the importance of the 12 million-odd bullock-carts in the Indian transportation system. About 20 million people are involved part-time or full-time in the bullock-cart business, the same number as employed in the entire organized industrial and trade sectors of the Indian economy. Dr. Ramaswamy says a rural transportation system based on bullock carts can provide enormous employment. "So the problem before us," he argues, "is not how to get rid of the bullock-cart but how to make it more efficient."

Conventional bullock-carts have several design defects: their range and load capacity are small; their wheel bearings produce too much friction; and the cart itself is very heavy.

The harnessing device is also of poor design. It consists of two wooden beams attached to a yoke which weighs heavily on the bullock's neck -- a force of 100 kg even if the cargo is only 60 kg. This often reduces the working life of the animal by as much as 10 percent. And because the yoke is generally made of rough hardwood, it bruises the soft skin on the animal's neck, often producing a cancerous neck-gall. A good suspension yoke similar to those used with a horse and cart would eliminate the great vertical weight on the bullock.

The Dunlop Company's efforts to replace wooden wheels with pneumatic tyres have helped to increase the carrying capacity of carts from 750 to 2,500 kg. Earnings of some "Dunlop" cartmen have quadrupled. Even banks are now willing to finance the purchase of modernised carts.

In agriculture too, animal energy will remain a principal energy source for many decades. About two-thirds of energy used on Indian farms comes from animals.

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The International Crops Research Institute for the Semi-Arid Tropics at Hyderabad has designed new ploughs which double the output of work without any extra burden on the animal. The Institute is also designing a better harnessing device for ploughing.

Fuel for the cookstove

As animal power will likely continue to be of great importance to transportation and agriculture, so too another traditional source of energy remains domestically vital -- firewood. But although India may well be able to produce all the food it needs by the turn of the century, it is quite possible there won't be enough fuel to cook it.

Firewood, 1.2 kg of which is needed to cook a single kilogram of food, is becoming scarce because of increasing deforestation. It was even rationed recently in the Nilgiris district and in certain regions of north Bengal.

"We are already using renewable energy sources in a big way," says Maheshwar Dayal, a senior official of the Department of Science and Technology. Cowdung, firewood, forests and agricultural wastes provide more than 40 percent of India's annual energy consumption. Firewood alone accounts for about 28 percent of the total. "But we are using these sources in an unscientific and unplanned manner. We are mining our forests, not harvesting them," says Mr. Dayal.

Until recently, the government's plans were to replace firewood with kerosene. But with the rise in oil prices, kerosene will be unable to meet the needs of the majority of the people. And "if burning of firewood continues at the present rate, there will be a crisis in the supply of firewood as well by 1985-86," says Dr. L.C. Sharma, an economist formerly with the Planning Commission.

In the old days, each village was surrounded by a forest or a grove of fruit trees -- like the mango groves of northern India -- which met its energy needs. But these 'social forests' are now disappearing.

The Planning Commission has given a high priority to social forestry programmes in the Sixth Plan to maintain ecological balance and meet the fuel and fodder needs of the people. A new scheme of rural wood plantations and farm forestry will be launched covering 100 neglected districts where shortages of firewood are particularly acute.

Out of the 75 million hectares classified as forest land, only 60 million hectares are being exploited. One expert estimates that if the remaining 15 million hectares were planted with quick-growing species, 90 million tonnes of wood could easily be raised.

Research programmes for firewood are aimed mainly at identifying fast-growing species of trees which can grow under a variety of agro-climatic and soil conditions, especially on eroded and barren lands.

One Indian research centre has done extensive work on identifying fast-growing plants which can survive on substandard soils, including saline and alkaline soils. By planting these species, many of which are legumes, not only will fuel needs be met, but the quality of the land will also improve over time and become fit once again for agriculture.

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August 1981